

CLAIMS

1. A method to elongate a solder joint, the method comprising:
 - 5 forming an elongator on a first substrate, wherein the elongator comprises an expander and an encapsulant to encapsulate the expander;
 - forming the solder joint to connect the first substrate to a second substrate; and
 - softening the encapsulant to release the expander from a compressed state to elongate the solder joint.
- 10 2. The method to elongate a solder joint as recited in claim 1, wherein forming the elongator on the first substrate comprises:
 - providing a mold having a first mold cavity and a second mold cavity, wherein the first substrate is disposed in the first mold cavity and an expander is disposed in the second mold cavity;
 - 15 compressing the expander; and
 - introducing the encapsulant into the mold to encapsulate the expander to form the elongator on the first substrate.
- 20 3. The method to elongate a solder joint as recited in claim 2, further comprising:
 - singulating the first substrate.
- 25 4. The method to elongate a solder joint as recited in claim 3, wherein the first substrate is one of a group consisting of a series of interposers, a series of packages and a wafer.
5. The method to elongate a solder joint as recited in claim 2, wherein the first substrate is one of a group consisting of a chip, an interposer, a package, a board and a series of interposers.
- 30 6. The method to elongate a solder joint as recited in claim 1, wherein the elongator is formed on the first substrate by one of a group consisting of an injection

molding process, a compression molding process, a transfer molding process and a casting process.

7. The method to elongate a solder joint as recited in claim 1, wherein the
5 encapsulant is an electrical insulator.

8. The method to elongate a solder joint as recited in claim 7, wherein the
encapsulant is a thermoplastic.

10 9. The method to elongate a solder joint as recited in claim 8, wherein
forming the solder joint to connect the first substrate to the second substrate comprises:
melting a plurality of solder deposits to wet a solderable surface to form the solder
joint.

15 10. The method to elongate a solder joint as recited in claim 9, wherein the
thermoplastic has a softening temperature of approximately 40°C higher than a melting
point of the plurality of solder deposits.

11. The method to elongate a solder joint as recited in claim 8, wherein the
20 thermoplastic is one of a group consisting of polyamide and polyacetal.

12. The method to elongate a solder joint as recited in claim 1, wherein the
expander comprises a corrugated strip.

25 13. The method to elongate a solder joint as recited in claim 12, wherein a first
end of the corrugated strip overlaps a second end of the corrugated strip.

14. A device to elongate a solder joint, the device comprising:
a substrate; and
30 an elongator formed on the substrate, wherein the elongator comprises:
an expander in a compressed state; and
an encapsulant to encapsulate the expander.

15. The device to elongate a solder joint as recited in claim 14, wherein the substrate is one of a group consisting of a chip, an interposer, a package, a board, a series of interposers, a series of packages and a wafer.

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16. The device to elongate a solder joint as recited in claim 15, wherein the elongator is formed on the substrate by one of a group consisting of an injection molding process, a compression molding process, a transfer molding process and a casting process.

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17. The device to elongate a solder joint as recited in claim 14, wherein the expander comprises a corrugated strip.

18. The device to elongate a solder joint as recited in claim 17, wherein a first 15 end of the corrugated strip overlaps a second end of the corrugated strip.

19. The device to elongate a solder joint as recited in claim 14, wherein the encapsulant is an electrical insulator.

20. The device to elongate a solder joint as recited in claim 19, wherein the 20 encapsulant is a thermoplastic.

21. The device to elongate a solder joint as recited in claim 20, wherein the thermoplastic is one of a group consisting of polyamide and polyacetal.

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22. An electronic assembly, comprising:
a first substrate coupled to a second substrate by a solder joint; and
an elongator coupled between the first substrate and the second substrate, wherein
the elongator is formed on the first substrate and wherein the elongator comprises:
30 an expander; and
an encapsulant to encapsulate the expander.

23. The electronic assembly as recited in claim 22, wherein the encapsulant is an electrical insulator.

24. The electronic assembly as recited in claim 23, wherein the encapsulant is
5 a thermoplastic.

25. The electronic assembly as recited in claim 24, wherein the thermoplastic is one of a group consisting of polyamide and polyacetal.

10 26. The electronic assembly as recited in claim 22, wherein the expander comprises a corrugated strip.

27. The electronic assembly as recited in claim 26, wherein a first end of the corrugated strip overlaps a second end of the corrugated strip.

15 28. The electronic assembly as recited in claim 22, wherein the elongator is formed on the first substrate by one of a group consisting of an injection molding process, a compression molding process, a transfer molding process and a casting process.

20 29. The electronic assembly as recited in claim 22, wherein the first substrate is one of a group consisting of a chip, an interposer, a package, a board and a series of interposers.